Chronology

- May 1999 - Datalogging & Duty Cycles
- October 1999 - RFPs to Trap Mfgrs
- May 2000 - Installations of 4 DPF Systems
- May 2000 - Nov 2001 - Performance Evaluations
- February 2001 - Isolated Zone Study (Ambient Concentrations)
- February 2002 - DPFs de-commissioned
- September 2002 - Final Bench Testing in Lab at CANMET

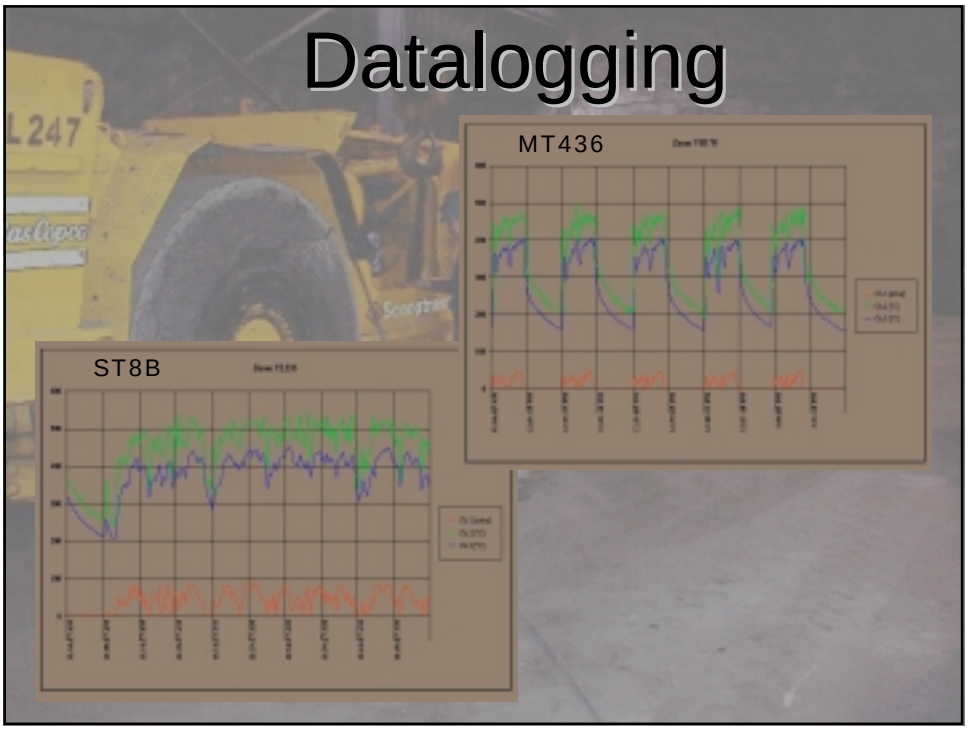
Vehicles

MT436 Trucks

ST8B Scoops

Datalogging

- Back Pressure
- Temperature 1
- Temperature 2


Datalogging
MT436
ST8B

DCL
Oberland Mangold
CatTrap
ECS additive

ECS CatTrap

- ST8-B Scooptram - VL244
- Detroit Diesel - Series 60 - 325 HP
- Twin ceramic monoliths with base metal catalyst
- Passive regeneration

Data From ECM @	Fuel Consumption	Operating Hrs	Idling Hrs
Trap Installation	8034 igals	1005	194.5
Nov 2nd, 2001	35869 igals	4539	969
Jan 24th, 2001	40073 igals	5058	1081
TOTALS	**32039 igals**	**4053 hrs**	**887 hrs**

Fuel Consumption Avg: 7.905 gals/hr
Percent @ Idle : 21.89%

DCL

- ST8-B Scooptram - VL247
- Detroit Diesel - Series 60 - 325 HP
- SiC monolith with precious metal catalyst
- Passive regeneration with Active - Electric assist

Data From ECM @	Fuel Consumption	Operating Hrs	Idling Hrs
Trap Installation	0.8 igals	0.3	0.2
Trap Removed	1885	293	60
Trap Re- Installed	3713	577	118
June 7, 2001	24141 igals	2999	716
Nov 5th, 2001	32635 igals	4092	944
Jan 24th, 2002	36152 igals	4545	1033
TOTALS	**34323 igals**	**4261 hrs**	**975 hrs**

Fuel Consumption Avg: 8.055 gals/hr
Percent @ Idle : 22.88%

ECS - Octel

- MT436-B Truck - VH183
- Detroit Diesel - Series 60 - 375 HP
- SiC twin monolith with fuel borne catalyst (Octimax 4804)
- Passive regeneration with active fuel borne catalyst

Data From ECM @	Fuel Consumption	Operating Hrs	Idling Hrs
Trap Installation	1382 igals	293	128
Filter Replaced	17249 igals	2763	984
June 7, 2001	18187 igals	2923	1043
Oct 23, 2001	23939 igals	3785	
Jan 24,2002	28448 igals	4382	1474
1st Filter Totals	15867 igals	2470 hrs	856 hrs
New Filter Totals	11199 igals	1619 hrs	490 hrs

Fuel Consumption Avg: 6.917 gals/hr
Percent @ Idle : 32.5%

Oberland Mangold - Octel

Oberland Mangold - Octel

- MT436-B Truck - VH181
- Detroit Diesel - Series 60 - 375 HP
- Wound Fibre Cartrdiges with fuel borne catalyst (Octimax 4804)
- Passive regeneration with active fuel borne catalyst

Data From ECM @	Fuel Consumption	Operating Hrs	Idling Hrs
1st Trap Installation	13185 igals	2265	653
2nd Trap Installation	14958 igals	2593	737
June 8, 2001	27663 igals	4096	1207
Oct 23, 2001	33685 igals	5000	
Jan 24, 2002	36732 igals	5491	1658
TOTALS	**21774 igals**	**2898 hrs**	**921 hrs**

Fuel Consumption Avg: 7.513 gals/hr
Percent @ Idle : 31.8%

Interim Inspections
✔ Visual Success

Interim Inspections
✔ Visual Success

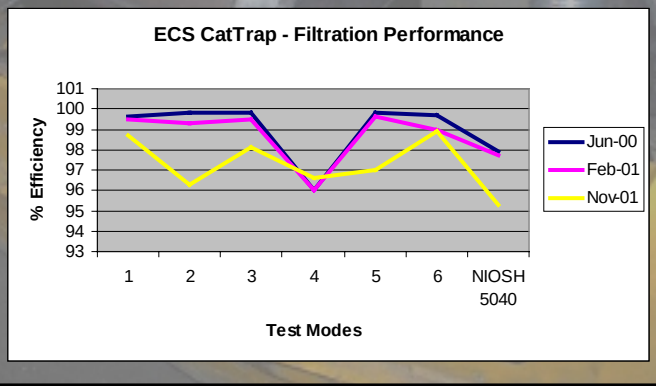
Interim Inspections

✘ Visual Failure

ECS CatTrap

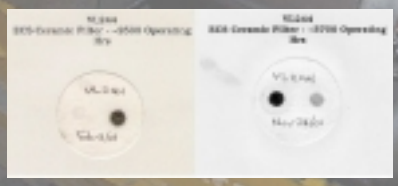
Performance Evaluations

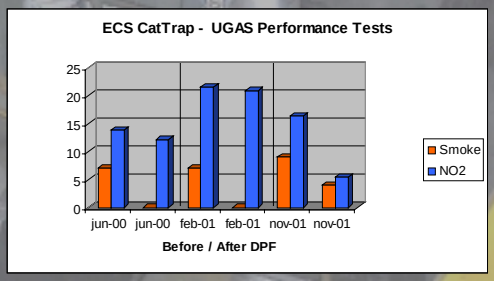
- *Full throttle – Full Torque Converter Stall*
- *Snap Acceleration – Free No Load (Sets of 3)*
- *Snap Acceleration – Full Torque Converter Stall (Sets of 3)*
- *Idle – No Load*
- *Full Throttle – No Load*
- *Full Throttle – Full Torque Converter Stall*

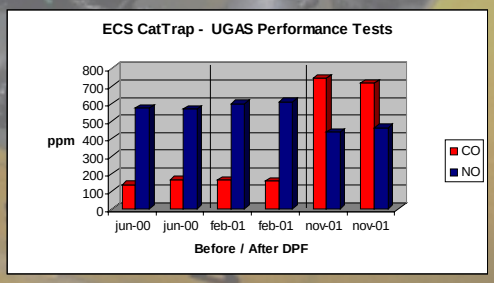


ECS CatTrap

Performance Evaluations







DCL

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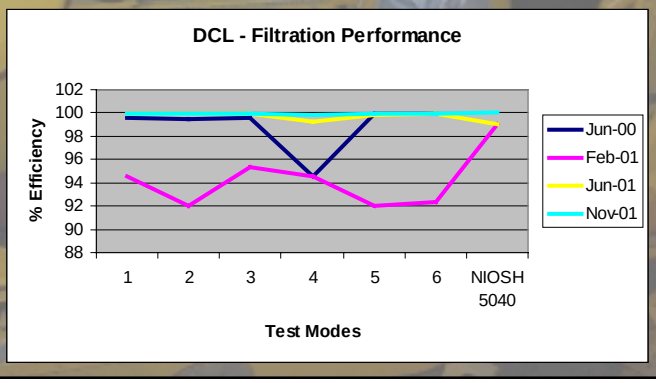
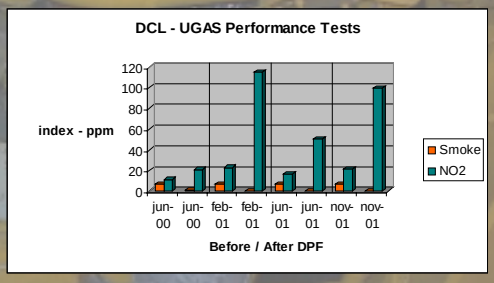
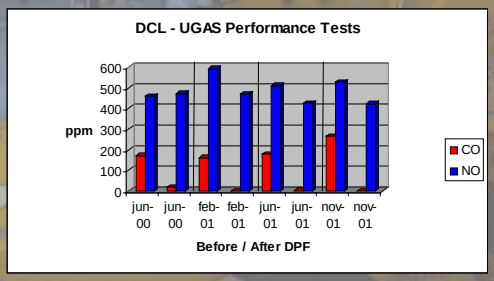


DCL

Performance Evaluations





ECS - Octel

Performance Evaluations

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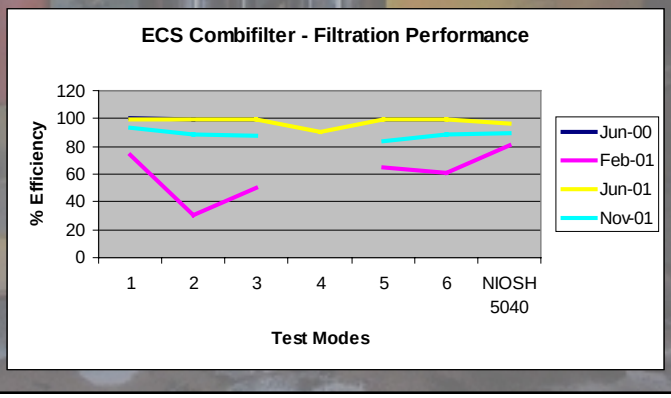
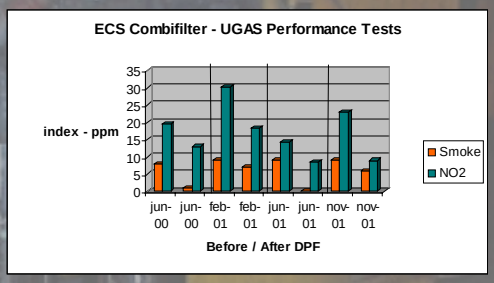
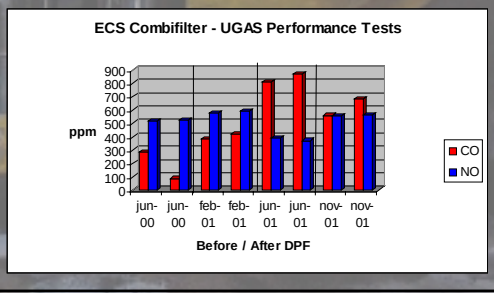


ECS - Octel

Performance Evaluations





Oberland Mangold - Octel

Performance Evaluations

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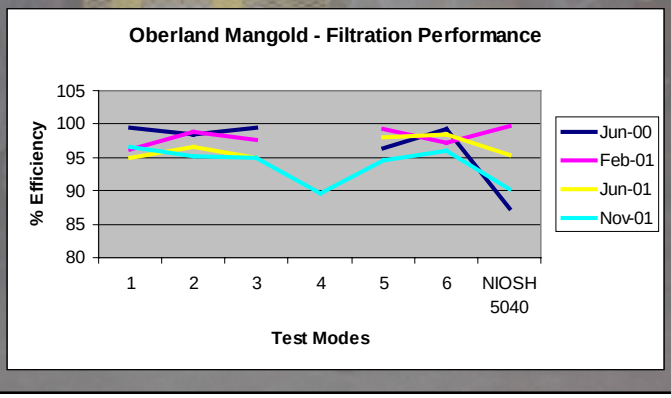
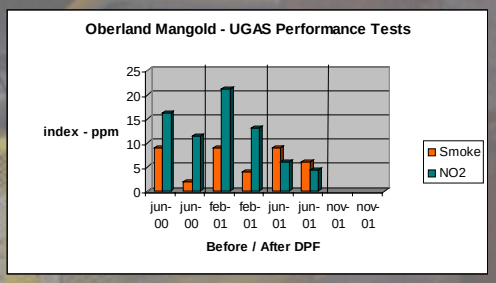
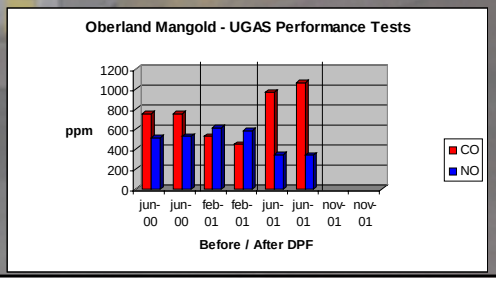


Oberland Mangold - Octel

Performance Evaluations





noranda

Brunswick Mine

ISOLATED ZONE STUDY 525-5 SUB LEVEL

noranda

Brunswick Mine

Gravimetric Concentration

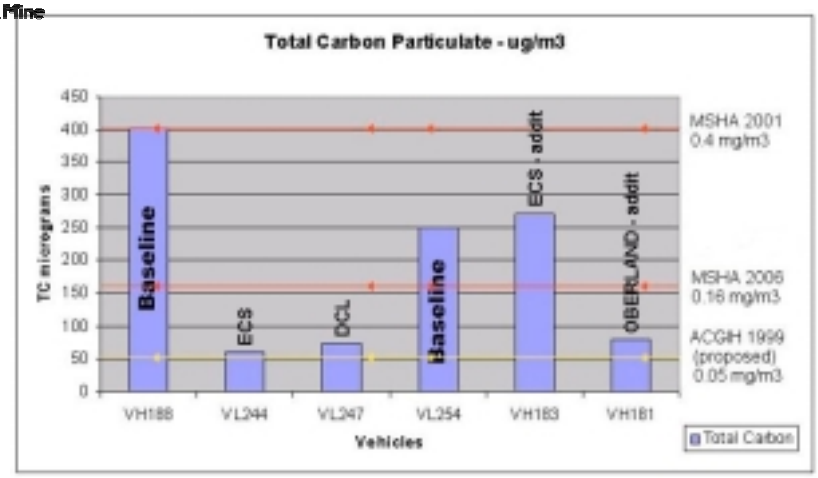
noranda

Brunswick Mine

Gravimetric Concentration

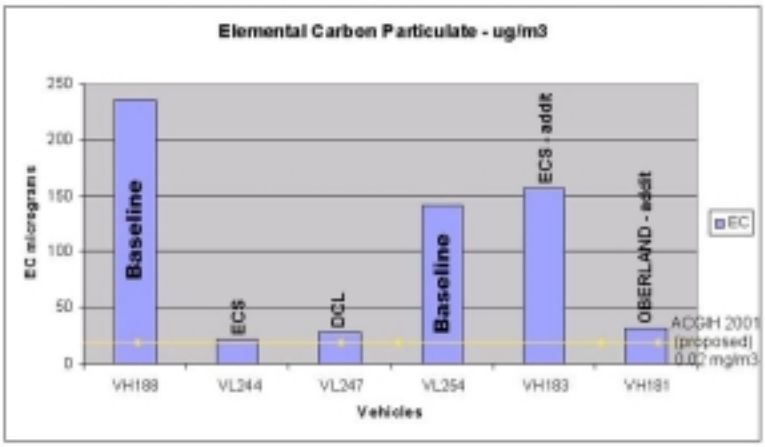
EC/OC Concentrations

Brunswick Mine



EC/OC Concentrations

Brunswick Mine



ECS CatTrap

Plus / Delta

UPS	DOWNS
Totally Passive – no auxiliaries	Not suitable for MT436-B trucks
Regenerates in ST8-B application	No integrated alarm & control
Very high filtration efficiency	No insulation package (that works)
Good application design	Leaks at gaskets and flanges
Favored by operators	
Favored by mechanics	
Very rugged and durable	
Easy retrofit – fits in frame well	
Easy to service – filter body R&R	
Base metal catalyst – No NO2 conversion	

DCL

Plus / Delta

UPS	DOWNS
Can be suited to any application regardless of duty cycle	Hi maintenance system and difficult to service
Very high filtration efficiency	Poor acceptance by operators
	Poor acceptance by maintenance
	PGM catalyst – NO2 conversion
	No integrated alarms
	Excessive infrastructure requirement
	No insulation package (that works)
	Underdesigned for application
	Leaks at gaskets and flanges

ECS - Octel

Plus / Delta

UPS	DOWNS
Very high filtration efficiency (before failure)	Poor design for application
	Fuel additive didn't work
	Infrastructure for additive
	Poor acceptance by mechanics - size
	Indifference from operators
	Backpressure problems - regeneration
	No integrated alarms
	Leaks at gaskets and flanges

Oberland Mangold - Octel

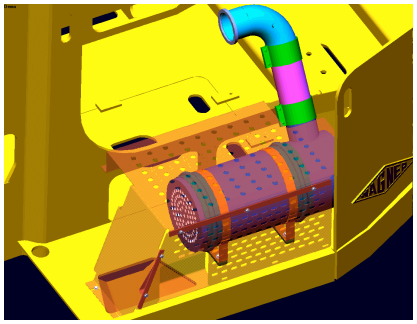
Plus / Delta

UPS	DOWNS
No backpressure problems	Too big!
	Poor acceptance by mechanics
	Indifference by operators
	Fuel additive didn't work
	Infrastructure for fuel additive
	Very difficult to service
	No insulation package
	No integrated alarms
	Leaks at gaskets and flanges
	Difficult to retrofit

noranda

Brunswick Mine

The Future



Continued Testing
Engelhard
Atlas Copco / DDC
Kubota Tractors

ECS CatTrap
for new ST8-Bs

INCO

Stobie Mine

Application 1: ST8B LHD

- Engine: Deutz F12L413FW
- DPF Mfgr: Johnson Matthey
- DPF Filter: Dual Silicon Carbide (SiC)
- Regeneration: Passive Fuel Borne Catalyst (Eolys)
- Regeneration: Active On-Board Electric
- Engine Problems

Stobie Mine

Application 2: ST8B LHD

- Engine: Detroit Diesel Series 60
- DPF Mfgr: Oberland Mangold / Unikat
- DPF Filter 1: Glass Fiber Cartridges
- DPF Filter 2: Silicon Carbide (SiC)
- Regeneration 1: Fuel Borne Catalyst (Platinum Plus)
- Regeneration 2: Combifilter On-Board Electric
- Oberland Mangold low efficiency and problems replaced with Unikat Combifilter

Stobie Mine

Application 3: ST8B LHD

- Engine: Detroit Diesel Series 60
- DPF Mfgr: Engelhard
- DPF Filter: Cordierite EX-80 with catalyst washcoat
- Regeneration: Passive
- Failed due to blown turbocharger

Stobie Mine

Application 4: Kubota M5400 Tractor

- Engine: F2803B
- DPF Mfgr: ECS
- DPF Filter: Omega 3M Nextel Fiber Cartridges
- DPF Filter: Combifilter Silicon Carbide
- Regeneration: On-Board Electric (both)
- Omega Fiber Cartridges Discontinued - Replaced With Combifilter SiC

Stobie Mine

Application 5: Kubota M5400 Tractor

- Engine: F2803B
- DPF Mfgr: DCL International
- DPF Filter: Titan Silicon Carbide (SiC)
- Regeneration: Off-Board Electric

QUESTIONS?

LINKS

http://www.cdc.gov/niosh/mining/

http://deep.org

http://dieselnet.com

http://www.msha.gov/s%26hinfo/diesel.htm

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